general way the only such force that has ever been suggested is *intelligence*, and the intervention of that, though it is in no wise antagonistic to scientific Darwinism, at once strips its popular versions of their mechanistic implications. It is regrettable that on this fundamental question, also, of intelligent and *active* "adaptation," of the power of living organisms to alter radically the conditions of their survival, Prof. Keller's deliverances should be so vague. He is inclined to emphasise their ultimate dependence upon natural law (p. 22), without going deeply into the questions whether for many proximate purposes that dependence may not be neglected, and whether natural "law" itself is not ultimately conceivable as inveterate ancestral custom. The truth is—and it is a large portion of its truth to life—that the Darwinian theory abounds in subtleties which cannot be settled offhand, and that Prof. Keller does not always see them. For example, he argues (pp. 250-1) that "any settled folkway is justifiable in the setting of its time, as an adaptation." That is his Darwinian analogy of Hegel's "the real is the rational," and both dicta are, of course, eminently conservative. But he does not perceive that the real question is begged when he adds "it will be noted that the folkway is supposed to be a settled one, a tried and preserved variation": for where in the cosmic flux are such variations to be found? The secular struggle between Conservatism and Liberalism is not to be thus easily decided *a priori;* the decision must depend *in each case* on the relative advantages and disadvantages of retaining or altering some particular adaptation. After all these strictures, however, it is a pleasure to note that Prof. Keller devotes considerable space to eugenics, and that his views are moderate and sound. He appreciates Galton. He points out that social counter-selection is largely normal. He does not consider the prospects of the American laws about sterilisation and marriage certificates to be bright, but thinks that it will have an effect to show to people that at present they are heavily taxed for the support of those who should never have been born. Possibly by the time they have done with paying taxes also for those who should never have been killed, eugenists will be wishing that they, too, had never been born! F. C. S. SCHILLER.

Gates, R. RUGGLES. *The Mutation Factor in Evolution: with particular reference to* Œnothera. Macmillan and Co.; 1915; 10s. net.; pp. 354.

To those at least who are not specialists in the subject, the problems presented by the genetics of the *Œnotheras* (Evening Primroses) have seemed during the last few years so hopelessly confused and entangled as to make it useless to attempt to follow closely the many papers dealing with them. The mutation theory of De Vries was based largely on his work with *Œnothera*, and although the importance in evolution now generally ascribed to mutation has largely grown out of that work, De Vries's interpretation of his results with regard to *Œnothera* itself has nevertheless been widely doubted. While some accept his conclusion that the many forms produced by *Œnothera Lamarckiana* are actually "mutations" occurring spontaneously under the eyes of the experimenter, others maintain that *Œnothera Lamarckiana* has never been a wild species, that it is a hybrid from between two or more natural species, and that the so-called mutations are produced by the segregation and re-combination of Mendelian characters. When several experimenters, working with the same or similar material, come to diametrically opposite conclusions, and when further, as has happened in this case, they allow their differences of opinion to lead to personal controversy of a rather bitter kind, the unprejudiced onlooker tends to let those directly concerned fight the matter out among themselves, and to wait in patience for some full and satisfying account which shall set the whole matter permanently at rest.

The aim of the book before us is to give such an account of the *Œnothera* problem. Its title is really misleading, even when its descrip-

tive sub-title is included, for its true subject is the mutation factor in *Œnothera*. It is, in fact, a monograph of our present knowledge of the *Œnothera* problem, written by one who has for years been engaged in research in the subject, and who at least has full knowledge of the facts. Whether, however, it provides the final solution of the controversy, for which we have been waiting, is not so certain. The author is a thorough De Vriesian mutationist, and makes out a very strong case for his faith, but the fact that he often dismisses his opponents' opinions as untenable, with such a phrase as that "any detailed criticism is unnecessary," leads the reader to suspect at times that the opponent might be able to reply effectively if the detailed criticism were offered. It is true that the positive arguments in favour of true mutation and against the hypothesis of Mendelian segregation are presented very strongly and effectively, but we cannot help regretting that the arguments on the other side are not also given, if only to show their inferiority to those upheld by the author.

As a collection of the facts at present known the book is valuable, but in spite of the great amount of work that has been done, the facts are still known very incompletely, and the word "probably" is used with tiresome frequency. Also, when our knowledge is more complete, we suspect that the facts will become less bewildering; it is probably rather the author's misfortune than his fault that his account gives the impression of confusion. We find some mutations which breed true while others are inconstant; some are Mendelian dominants or recessives in relation to their parent types while others when crossed with the type segregate in the F_1 generation; and others again have simple Mendelian inheritance when crossed with one form, and segregation in F_1 when crossed with another. Very interesting, and on the whole more definite and regular, are the cases of mutations due to abnormalities in chromosome number—*lata* with one extra chromosome (15), *semigigas* with 21, and *gigas* with 28, *i.e.*, twice the normal number. Forms with other numbers also occur. In this field the author has been one of the pioneers, but here again his account suffers from the gaps in our knowledge, and to some extent from the inadequacy of his comparison with other forms, which in our opinion should have been either fuller or omitted completely.

The chapter on *Hybridisation and Hereditary Behaviour* repeats and summarises a good deal which has been given earlier, and emphasises in the mind of the reader the very peculiar nature of the problems presented by *Œnothera*. The phenomenon of "Twin Hybrids," for instance, is so remarkable as to make one feel that no conclusions derived from a study of *Œnothera* genetics can be accepted as generally valid until this one is fully explained. When, for example, *Lamarckiana* is crossed with *biennis*, the first generation of hybrids consists of two types (*laeta* and *velutina*), neither of which resembles either parent, and both of which, in some cases at least, breed true. Now when a supposed pure species behaves in this way, when at the same time about half its pollen-grains are constantly "bad," and when, further, it is known that in certain of the crosses, and even in self-fertilised *Lamarckiana*, about half the ovules fail to produce viable seeds, one begins to wonder whether the occurrence of mutations in such a species, even if crossing had no share in its origin, can give any clue to the occurrence and importance of mutation in other forms. The abnormal cytological conditions of *Œnothera* are doubtless connected with these peculiarities, and it seems probable that one of the most hopeful lines of work towards their explanation is a continuance of the chromosome researches in which Dr. Gates has played a prominent part.

In the presence of a case so peculiar in many ways, we do not feel convinced that the author has finally proved his contention that Mendelian principles cannot apply to many of the phenomena observed. That the mutations are not simply due to Mendelian re-combination following on hybridisation may be granted, but the author would clearly have us

go further than this, and admit that Mendelian heredity is altogether inapplicable to much that is found in *Œnothera*. With some of his criticisms of current Mendelian speculation we fully sympathise, as when he writes: " .. . . the thing which is called a 'factor' is only a *difference* in the structure of the cell or some part of the cell, and it may apparently be of any kind whatever. That difference has been produced by a change, and the change constitutes what we call a mutation." But it seems to us doubtful whether the *Œnotheras* can rightly be used to show that such a difference, when it occurs, is ever transmitted other than in the Mendelian manner when the mutant is crossed with the type, for the conditions governing the production of germ-cells are clearly so complicated that apparent failure of Mendelian transmission may perhaps be due simply to our ignorance of the processes involved. The right, if unsatisfactory, attitude seems still to be one of open-mindedness rather than of dogmatic conviction in either direction.

The book contains a full bibliography, and is illustrated with many photographs, but these, though generally good, are not of much help in understanding the differences between the various forms. L. D.

Glasgow, MAUD, M.D. *Life and Law.* Publisher: Putnam; 1914; price $1.25 net; pp. 187.

THIS book is a study of the development of the exercise of the sex function and an appeal for the hygiene of sex. Both from the biological and social points of view, sex and reproduction are of vital importance. Ignorance is responsible for a very large measure of social evil, and it is only by the spread of knowledge as to the causes of prostitution and venereal disease that we can hope for an awakened opinion and a demand for sound sex hygiene.

Dr. Glasgow gives an interesting summary of the evolution of sex, and treats simply and concisely with the physical aspect of the question, including the care of expectant motherhood and pre-natal influences upon the child. Several chapters are devoted to the study of prostitution, and stress is laid upon the inadequate protection afforded to women by the laws of many States in America. Suggestions are made with regard to the amelioration of social conditions which will lead to a reduction of what is called the social evil. The necessity for instruction in the hygiene of sex is emphasised and suggestions are given to parents. I would, however, differ from the author when she declares that instruction in sex should begin as early as three or four years of age. It is quite exceptional for a child to show any curiosity about sex until five or six years of age, and even then, instruction should consist in answering direct questions. It is easy to err on the side of unnecessarily stimulating the curiosity of children about sex. But very few of us would differ from the author in her contention that all children should have instruction from their parents in this most important subject, and that parental instruction should be followed up by teaching in the schools, which can be associated with biological instruction—nature study. Simple facts about reproduction in plant and bird-life make the best foundation for instruction in sex hygiene. Dr. Glasgow gives many useful suggestions which will be of value to both parents and teachers. ELIZABETH SLOAN CHESSER, M.B.

Bruce, ADDINGTON. *Psychology and Parenthood.* Publishers: Dodd Mead and Company; 1915; price $1.25 net; pp. 293.

THE necessity for the better education of parents is universally recognised, by the people at least who are associated with problems of childhood and education, so that this simple text-book for parents is useful by the very fact of its simplicity and the popular style in which it is written. The average parent has no knowledge of technicalities and cannot be expected to grasp more than the simple outline of child psychology. All parents make mistakes in the training of their children, but the more knowledge